POLSKA AKADEMIA NAUK
INSTYTUT PARAZYTOLOGII

# ACTA PARASITOLOGICA POLONICA

VOLUMEN XXIX

WARSZAWA 1984

PAŃSTWOWE WYDAWNICTWO NAUKOWE

POLSKA AKADEMIA NAUK
INSTYTUT PARAZYTOLOGII

# ACTA PARASITOLOGICA POLONICA

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ul. L. Pasteura 3, S.p. 153
00–973 Warszawa, Poland

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*To commemorate*
*50th Anniversary*
*of his death,*
*this volume is dedicated to*

# *CONSTANTIN JANICKI*

*who greatly contributed*
*to the development of modern parasitology,*

*and to all those*
*who, working under his inspiration,*
*have provided invaluable information*
*for broadening the foundations*
*of our knowledge*
*of evolutionary parasitology*

Walking in the University gardens ...

Constantin Janicki photographed by Dr. S. Sekutowicz at the time of his Directorship at the Zoology Institute of the University of Warszawa

# CONSTANTIN JANICKI
# (1876–1932)

by Włodzimierz Michajłow, Institute of Parasitology, Polish Academy of Sciences, Warsaw

This year marks the 50th anniversary of the premature death of Konstanty Janicki*, a distinguished Polish zoologist and parasitologist. It coincides with the 80th anniversary of the publication by Janicki of his first scientific contribution (1902).

Fifty years – with the present-day rapid advances in sciences, and that goes also (perhaps above all) for biological sciences – is certainly a sufficiently long time to assess the importance and significance of the scientific record of a scientist and the lastingness of his achievements, to define their meaning for the further development and progress of the field of study pursued by him.

Viewing the intellectual and research record of Constantin Janicki from this perspective, we can recognize that all the named criteria and assessments have been positively confirmed, that the figure of this scientist and his works have entered to stay the history of zoology and parasitology, they have become part of the world treasury of scientific biological thought. There are many convincing proofs of the veracity of this statement. The most evident among them is the fact that one cannot imagine now a textbook of zoology or parasitology, in which Janicki's basic discoveries would not be considered. This is unquestionably one of the undisputable and evident proofs of lastingness of the work of a scientist.

But before we proceed to present in greater detail the discoveries and studies of Janicki it will be worthwhile to refer to some basic facts in his life story, which incidentally perfectly illustrate the development and directions of his scientific interests.

Born on 16th November 1876 in Moscow in the family of Stanisław Janicki, a well-known engineer, and Emilia née Pelizarro, he graduated from a secondary school in Warsaw in 1893. He took his further studies over many years exclusively abroad. Each stage of these long and extensive studies contributed to increasing his interests in depth and width and was mapping out at the same time new directions of further scientific development. The course of study, he took in the University of Leipzig (1894–1898) under the guidance of W. His, L. Looss, W. Ostwald and R. Leuckart, the father of modern helminthology, clearly determined the interest of the student in the systematics and biology of helminths, i.e., parasitic worms. In Fribourg, where he lived in the years 1898–1901, Janicki, influenced

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* His original Polish first name is Konstanty which corresponds to the name Constantin used in most of his published contributions.

by lectures of A. Weismann, a prominent biologist and the founder of the widely known theory of heredity, broadened the area of his interests to organic evolution which had continued to fascinate him all throughout his further scientific work. In the University of Basel where he worked under F. Zschokke, a distinguished parasitologist, Janicki received the title of doctor of philosophy for his studies on cestodes of mammals (1906).

The knowledge of parasitic protozoans he acquired working in turn in Rome, in the laboratory of G. B. Grassi, a well-known protozoologist, where he mastered the cytological methods then used. While his studies at that time applied chiefly to *Flagellata*, during his stay in a zoological station at Naples and in the Marine Institute at Messina in 1911, he concerned himself with another protozoan group, namely parasitic amoebae. Thus, when he was awarded the degree of privat docent in Basel in 1912, he was already a scientist with a wide range of interests, thoroughly prepared for didactic and research work.

In 1919, Janicki returned to Poland and took up the post of professor of zoology and head of the appropriate Chair and Department in the reestablished Warsaw University, in which he worked to the end of his life. In the course of a few years, as a result of his intensive efforts, the Warsaw University Chair and Department of Zoology had become the leading national centre for didactic and research work in the area of zoology and parasitology. In appreciation of his research, conceptual and organizational work devoted to shaping scientific life in the country, he was admitted to the Polish Academy of Arts as corresponding member (active member since 1930) and became member of the Warsaw Scientific Society, and he was also charged for a time with the duties of curator and director of the State Zoological Museum. In 1920, Janicki drew up an interesting memorandum concerning organization of scientific life in the country and requirements of science in Poland.

The share of Constantin Janicki in international scientific life found an expression, among other things, in the fact that he was appointed member of the International Commission on Animal Parasitology during the 10th International Zoological Congress in 1927, and in 1928 as the sole Polish contributor to a guide book called Index biologorum published in Berlin he prepared a comprehensive information about Polish biologists and biological research centres, covering several hundred entries.

Proceedings to discuss the research record of Janicki, it will be most convenient – without keeping to a general chronological order – to treat separately the two fields of study, anyway continually intertwining, in which he engaged, namely helminthology and protoparasitology.

## The work in helminthology

Janicki published his first helminthological study in 1902, describing two new tapeworm species of the genus *Davainea* whose hosts were rodents living in Celebes Is. In his further studies devoted to cestodes parasitic in marsupials, edentates, South African insectivorous mammals and fishes of the Nile, and also sorting out material derived from New Guinea, that is, from areas little known then from helminthological viewpoint, he described new tapeworm genera and 26 species new to science. These descriptions featured high accuracy and care. Nearly all of the tapeworm species described by Janicki have been recognized by later investigators and held their ground

in science, and two of his general studies concerned with cestodes of mammals (1904, 1906) are reckoned as basic to this day. However, Janicki was interested not only in data relating to the structure of cestodes and their significance in the systematics of this group but also in the knowledge of embryonic development, life cycles and biology of these animals. Moreover, he called attention to "lower" cestodes, primarily *Pseudophyllidea*, whose life cycles were still very little known at that time.

Following a study over several years, initially carried together with F. Rosen who worked in Neuchâtel, while Janicki conducted his investigations in the laboratory of Galli Valerio, a well-known parasitologist, near Lausanne, the complete life cycle of the cestode *Diphyllobothrium latum* (L.), then called *Dibothriocephalus latus*, was described. In a contribution published jointly with Rosen in 1917, a description has been given of the full life cycle of the pseudophyllidean tapeworm, in which three larval forms are involved. These are the free-living ciliated coracidium with an oncosphere, the procercoid parasitic in the haemocoele of *Copepoda*, and lastly the plerocercoid from the body cavity of the fish. The sexually mature tapeworm, as the fourth and last form of ontogenesis, develops in the intestines of mammals, man included. The material for his investigations Janicki took from a fisherman who happened to be a carrier of the adult form of the tapeworm.

Soon after the discernment of the *Diphyllobothrium latum* life cycle, which has been recognized as the biggest achievement of helminthology in those days, Janicki, working already on his own, described similar life cycles of *Triaenophorus nodulosus* (Pall.), a fish parasite, and a tapeworm of the genus *Ligula* whose final hosts are birds.

Those pioneering studies which had won general recognition, marked the beginning of regular investigations on tapeworm life cycles, conducted not only in the Warsaw University Department of Zoology but all over the world, too. In Warsaw, active in this field was also J. Ruszkowski who demonstrated, i.a., that procercoids occur, like in *Pseudophyllidea*, in some cestodes of the order *Tetrarhynchidea*, and the life cycle of those parasites proceeds also in two intermediate hosts (marine crustaceans and fishes). Janicki himself, who had already earlier taken interest in the egg structure of cestodes belonging to different systematic groups, noted, among other things, also the structural details of their embryos and larvae.

Faithful to his evolutionary interests, and considering his research findings on the *Pseudophyllidea* life cycle, Janicki drew far-reaching conclusions concerning the phylogeny of *Platyhelminthes*. In 1920 b, he published his well-known study in which he outlined the Cerkomer Theory with reference to *Cestoda* and *Trematoda*. Setting out from a detailed description of the new discovered tapeworm larval form which is the second stage in the cestode life cycle, i.e. procercoid provided with a caudal appendage which he called the cercomer, and also comparing the larva with mature ectoparasitic *Monogenea* classified as trematodes at that time and distinguished by organs of adhesion bearing hooks, and with cercariae of proper trematodes (*Digenea*), also provided with a caudal appendage undergoing reduction during further run of the life cycle, Janicki believed that this was evidence of a common origin of all parasitic *Platyhelminthes*. He therefore proposed a common name for them, namely *Cercomorpha*, meant to reflect their common origination. In the light of later investigations,

however, the Cercomer Theory has been substantially curbed, since it has been definitely established that the tail in *Digenea* cannot be treated as a homologue of the cercomer in cestodes. Nonetheless, Janicki's Cercomer Theory, with respect to *Cestoda* and *Monogenea*, is still widely discussed by helminthologists and has become a significant incentive to detailed and synthetic investigations on the phylogeny of *Platyhelminthes*. In Poland, investigations along these lines had formerly concentrated in the Warsaw University Department of Zoology and were conducted on Janicki's initiative by his disciples and coworkers. Under his guidance, investigations were launched into what he called the subtle structure of *T. nodulosus* oncospheres and procercoids, host specificity and biology (W. Michajłow). At present, such investigations are carried out in Poland, principally in the Institute of Parasitology of the Polish Academy of Sciences.

Janicki also directed the interest of his disciples to the development of proper tapeworms (*Cestoda*) of the order *Pseudophyllidea*, such as the unsegmented *Archigetes* parasitic in *Oligochaeta*, which retains a prominent cercomer at the sexually mature stage and which for that reason has been recognized as a neotenic larval form, the procercoid which due to the abbreviation of the life cycle has acquired the ability to propagate in invertebrates (*Oligochaeta*). Fine results in this field were obtained by L. Wiśniewski, Janicki's coworker. A valuable monographic study of unsegmented cestodes of the same order, belonging to the family *Caryophyllaeidae*, was written by Janicki's disciple, S. Sekutowicz. I confine myself here to naming close disciples of Janicki or continuators in Poland of the research subjects pursued by him. The general research trend inaugurated by Janicki has also become the subject of many studies throughout the world. Even during his stay abroad, he displayed interest in the structure of *Amphilina foliacea* belonging to "lower" cestodes of the *Cestodaria* subclass. The adult of this unsegmented tapeworm lives in the body cavity, and not in the intestine, of the sturgeon. Janicki took it to be a neotenic larval form of the plerocercoid. Since, however, the *Amphilina foliacea* life cycle was still unknown then, he decided to make an "on-the-spot" investigation of it, that is, at a place where he would be able to find ample material readily available for study by methods fixed by himself. To this end, he went twice, in 1927 and 1928, to Saratov (USSR) where he carried out a series of experimental studies in the local Volga Biological Station. While on his second visit, he succeeded in establishing for certain that *Amphilina's* intermediate hosts are particular gammarid crustaceans, in which after they have swallowed the parasite's eggs containing the initial larval form, i.e. the lycophora bearing ten embryonic hooks, typical procercoids with a cercomer start developing. The sturgeon swallowing in turn the crustaceans get infested. Unsegmented mature individuals which are, according to Janicki, neotenic plerocercoids, develop in their body cavity. In this connection, he set forth the hypothesis that the ancient final hosts of *Amphilina* were large mesozoic reptiles feeding on this-fish species. The present life cycle, having one developmental phase less, is therefore shorter.

In these studies, too, Janicki has remained faithful to his evolutionary and phylogenetic interests. Moreover, his character and his predilections — interest in broadly conceived biological theories, combined with a most scrupulous study of detail during observations and experiments, became clearly manifestable in the course of these studies. Perhaps attesting most

aptly to his almost youthful enthusiasm and sensitivity to nature is the following quotation from his contribution on *Amphilina foliacea* development (1928 b), in which he describes not only his findings but also the course of his investigations day by day:

"Der mechanische Druck auf die Eischale – in der Natur also durch die Mundteile des Gammariden oder *Mysis* hervorgerufen, ist der auslösende Reiz, der den Embryo aus seinem durchaus passiven Zustand in einer eigentümlich gekrümmten Lage weckt. Auf einmal streckt sich der Embryo (solches unter gleichzeitigem Schlag der Cilien), der Körper wird walzenförmig, er kann beinahe die Länge des ganzen Eies erreichen; und nun beginnt ein geradezu rasendes Spiel von Kontraktion und Expansion in der noch intakt gebliebenen Eischale. Man kann diesem selten merkwürdigen Bild nicht ruhig zusehen, man fühlt sofort das Bedürfnis den beinahe unglaublichen Vorgang eines wie toll gewordenen Embryos unter dem Mikroskop seinen Nachbarn im Laboratorium zu zeigen! Das ist der Drang zum neuen, zum parasitären Leben des Amphilinembryos. Und doch hat der Embryo nicht selbst die Kraft in sich, um die dünne Eischale zu sprengen; das geschieht stets erst durch genügende Intensität des mechanischen Druckes von aussen".

The cordial relations he had established in the Volga Biological Station with his collaborators there are reflected not only in the text of the aforenamed study but also in the reminiscences of one of them, M. Levashov, published in Poland (1957).

During his stay on the Volga, Janicki together with a Czechoslovak investigator, K. Rašin, also studied the life cycle of another sturgeon parasite, namely the nematode *Cystoopsis acipenseri*.

Janicki returned to cestode systematics once more in 1928a when he published a description of cestodes in fishes and amphibians, collected in Egypt by a Swedish zoological expedition.

Concluding this cursory, of necessity, survey of Janicki's research record in the area of helminthology, one should emphasize once again that in this field his contribution is of fundamental importance, and he has also marked out the direction of further studies which to this day are being undertaken with reference to his views, ideas and research findings.

## The work in protozoology

The interest of Constantin Janicki in protozoology was stirred up first during his stay in the laboratory of G. B. Grassi in Rome, where he made a study of protozoans parasitic in cockroaches. Later, processing the material collected from termites by Grassi, he described a number of new *Flagellata* species from the gut of these insects, presenting the result of his investigations in two fundamental contributions on this subject. Taking interest in these protozoans in the cytological aspect, he described the structure and the process of division of the cell nucleus of these parasitic flagellates from termite gut. In the course of these cytological investigations, he discovered and described in detail in 1911 a new cell organelle which he named the parabasal apparatus. That apparatus, having a characteristic shape for different species but always present in the flagellates under investigation, is related in some way, according to Janicki, to the cell nucleus, whole divisions it precedes dividing independently, like another organelle, the blepharoplast. As it has been demonstrated in later times, the

parabasal apparatus occurs also in other flagellates, including *Trypanosoma*. It is closely associated with the belpharoplast, forming as if another cell nucleus, named kinetoplast by Alexeeff. Its function is probably connected with the of function flagellum. This is suggested by its presence in some other animals (e.g. in sponge choanocytes) having flagellated cells.

For a considerable length of time, Janicki carried out cytological studies of parasitic amoebae of the genus *Paramoeba*. As a homage to Janicki, the genus *Paramoeba* was renamed by Chatton in 1953 to *Janickina*. Death prevented Janicki from completing the further study of these protozoans, based on examination of the material collected by him in Messina in 1930.

One can therefore honestly say that Janicki made by his investigations an important contribution to protozoology, unquestioned and augmented to this day. But he did not have in protoparasitology so many disciples and direct continuators as he had in helminthology. One should mention here J. Jarocki and Z. Raabe. They engaged chiefly in investigations on *Ciliata*. Flagellates of the group *Euglenida* have been under investigation since 1955 by W. Michajłow.

Summing up the remarks on Janicki's scientific record, one should mention some of the characteristic features of his mentality as researcher. He always acted in a deeply premeditated and planned manner. He had the quality of being able to pick out research subjects of crucial importance, "demanding", so to say, to be solved and opening up new research vistas. He was a man of broad intellectual horizons, endowed with the ability of synthetic thinking. At the same time, he could conduct long, tedious and detailed observations and organized well-judged experiments.

One cannot fail to mention a fact important to Polish science, namely Janicki was the founder of a school of general parasitology in Poland. I have named above only some of the investigators belonging to that school. The subject is discussed in more detail by another distinguished Polish parasitologist, W. Stefański 1969. Janicki would enlist disciples from among the students in the course of his didactic activity, at lectures and practical occupations. He was not a good speaker. It did not come easy at all to him to word his thoughts, which probably was due to the fact that he had lived and worked outside Poland and spoken foreign languages for so many years. In spite of that, his lectures in systematic zoology were most popular with students. For they were deeply thought out and logically couched in words; they were at the same time imbued with the evolutionary idea and widely took account of latest scientific achievements that could not yet be found in any textbook. Practically all of his listeners would take detailed notes of his lectures. Before every lecture, he used to spend long hours standing by the writing desk in his study. He was setting in order his notes for the lecture and looking over both old and latest literature on the subject, he was to lecture. During those hours, he was not to be disturbed, and all the staff knew well about it. Thanks to his interesting lectures and his warm attitude to young people, more and more graduates wishing to take up research work in the area of zoology called at his laboratory. While signing the study record books of students, he sometimes asked searching questions which had a hidden meaning, though invariably the same: "Do you really want to work honestly for science?". In regard to those who truly wanted to devote themselves to it, he could personally go

about to secure scholarships for them or intervene in other matters with the University authorities.

He was loved by his disciples and collaborators, to whom his premature death fifty years ago was a grave loss.

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Compiled by W. Ślusarski

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Compiled by W. Ślusarski